Supplementary Material

(1) For the reference of potential researchers, the main urban economic indicators in 2011 and 2017 are added to the supplementary material. The specific analysis is as follows:

Table S1: Economic indicators of major cities in 2011

City clusters	City	Population (ten thousand)	GDP (100 million RMB)	Proportion of primary industry (%)	Proportion of secondary industry (%)	Proportion of tertiary industry (%)	Carbon emissions (million tons)	information infrastructure construction index
Beijing-Tianjin-Hebei	Beijing	1,277.9	16,014.06	0.68	22.84	76.48	80.72	3.54
	Tianjin	996.4	10,488.56	0.91	52.50	46.59	138.29	-0.12
	Shijiazhuang	997.3	1,469.96	0.43	31.44	68.13	98.61	-0.48
Yangtze River Delta	Shanghai	1,419.4	18,971.58	0.55	41.12	58.33	220.74	1.18
	Nanjing	636.4	5,538.93	2.01	43.35	54.64	69.26	1.39
	Wuxi	468	3,563.89	1.05	51.57	47.38	66.01	1.03
	Suzhou	642.3	4,061.64	0.86	53.88	45.25	127.54	1.08
	Hangzhou	695.7	5,589.86	1.89	44.70	53.42	66.84	1.99
	Hefei	706.1	2,380.22	0.49	54.26	45.25	37.46	-0.60
Pearl River Delta	Guangzhou	543.4	11,512.65	1.21	35.56	63.23	68.30	3.64
	Shenzhen	548.9	11,505.53	0.06	46.44	53.50	38.67	3.76
	Zhuhai	590.9	1,404.93	2.60	54.41	42.99	15.38	2.64
	Huizhou	225.6	1,361.12	2.40	64.13	33.48	35.65	-0.09
Middle reaches of Yangtze River	Wuhan	262.8	5,530.38	0.57	46.10	53.33	86.19	0.93
	Changsha	651.8	3540.16	1.48	46.46	52.06	59.73	0.65
Chengdu-Chongqing	Chongqing	3,329.8	10,161.17	5.71	56.35	37.95	147.64	0.66
	Chengdu	1,163.3	6,854.58	1.64	44.55	53.81	89.49	0.45

Source: Original data are from China City Statistical Yearbook, total carbon emissions and information infrastructure construction index are author-calculated.

Table S2: Economic indicators of major cities in 2017

City clusters	City	Population (ten thousand)	GDP (100 million RMB)	Proportion of primary industry (%)	Proportion of secondary industry (%)	Proportion of tertiary industry (%)	Carbon emissions (million tons)	information infrastructure construction index
Beijing-Tianjin-Hebei	Beijing	1,359	28,014.94	0.43	19.01	80.56	60.09	6.16
	Tianjin	1,050	18,549.19	0.91	40.94	58.15	150.05	1.21

	Shijiazhuang	973	3,396.28	2.17	38.88	58.95	94.95	1.13
Yangtze River Delta	Shanghai	1,455	30,632.99	0.36	30.46	69.18	192.50	3.11
	Nanjing	681	11,715.10	2.25	38.03	59.73	70.17	4.31
	Wuxi	493	5,465.28	0.81	41.33	57.86	62.48	2.38
	Suzhou	691	8,194.51	1.00	47.30	51.70	126.81	2.99
	Hangzhou	754	11,621.46	1.85	33.61	64.54	62.38	4.79
	Hefei	743	4,812.48	0.31	47.33	52.35	39.45	1.38
Pearl River Delta	Guangzhou	898	21,503.15	1.09	27.97	70.94	67.65	4.52
	Shenzhen	435	22,490.06	0.09	41.44	58.47	35.05	4.63
	Zhuhai	119	2,675.18	1.83	48.12	50.06	16.13	10.34
	Huizhou	369	2,407.93	1.84	56.85	41.31	39.43	1.66
Middle reaches of Yangtze River	Wuhan	854	13,410.34	3.04	43.71	53.25	89.07	2.57
	Changsha	709	6,390.34	0.91	35.39	63.69	69.20	1.98
Chengdu-Chongqing	Chongqing	3,390	20,066.29	6.90	44.10	49.10	153.75	0.39
	Chengdu	1,435	13,889.39	1.52	43.92	54.56	88.45	3.43

Source: Original data are from China City Statistical Yearbook, total carbon emissions and information infrastructure construction index are author-calculated

(2) Heat maps of major cities

According to the national economic development plan and the development of transportation, communication and other infrastructures, a number of city clusters in different stages of development and of different scales have been formed, namely Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta, Middle reaches of Yangtze River, Chengdu-Chongqing and other major city clusters, and the total economic volume of these five city clusters accounts for 60% of the country. In the "Supplementary Materials", we provide major cities' heat maps of GDP, IIC, and CEI and carbon emissions in all cities (plotted via python).

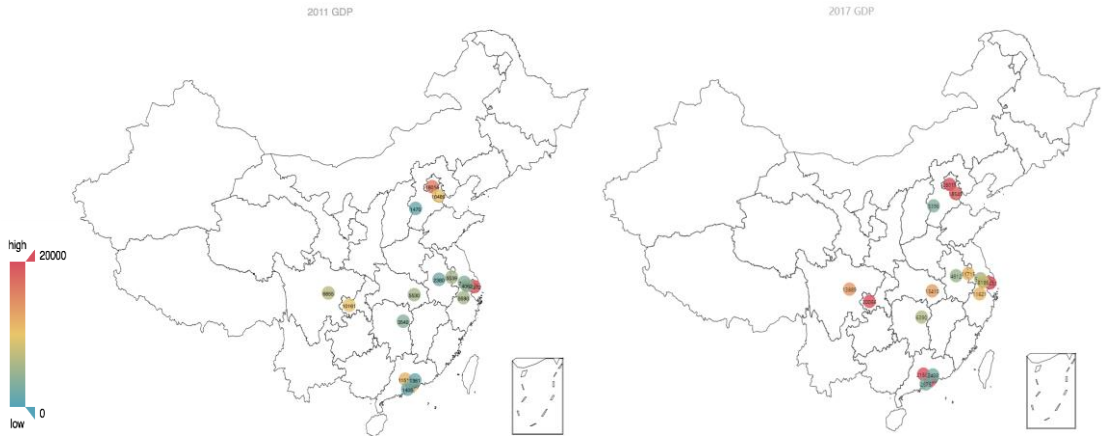

Figure S1: GDP heat maps of major cities

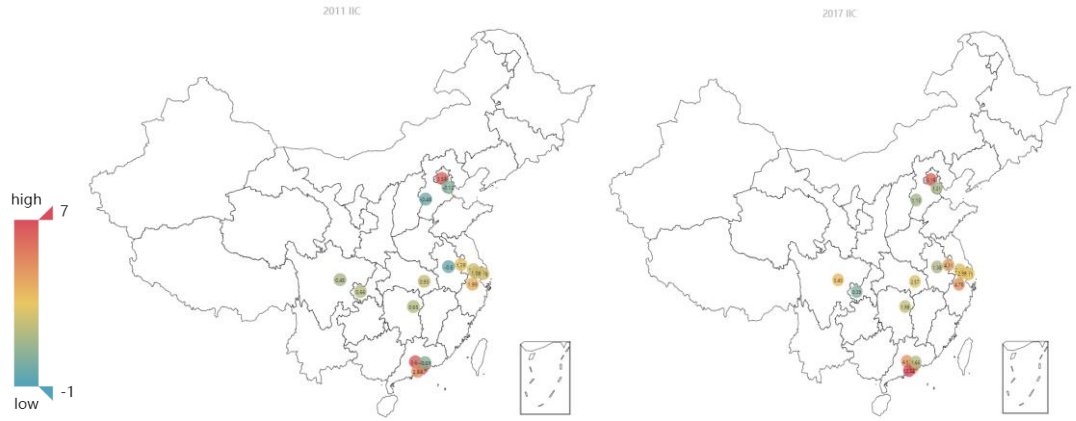

Figure S2: IIC heat maps of major cities

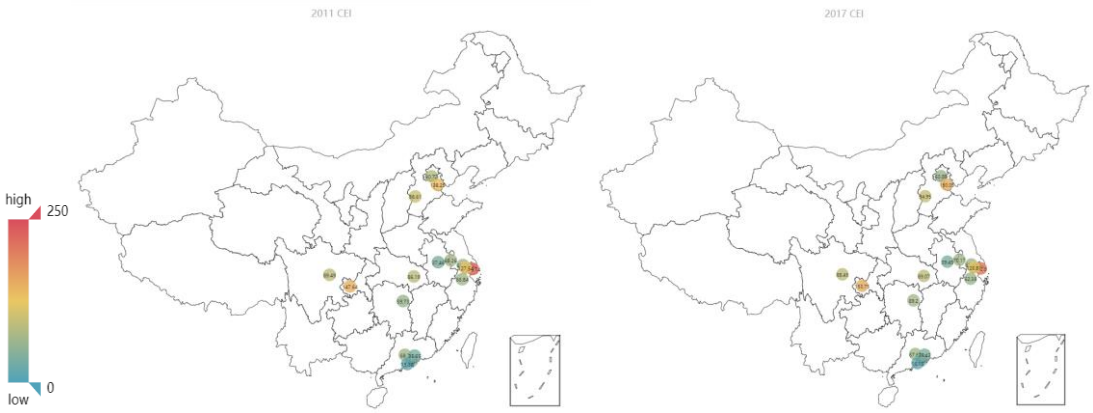

Figure S3: CEI heat maps of major cities

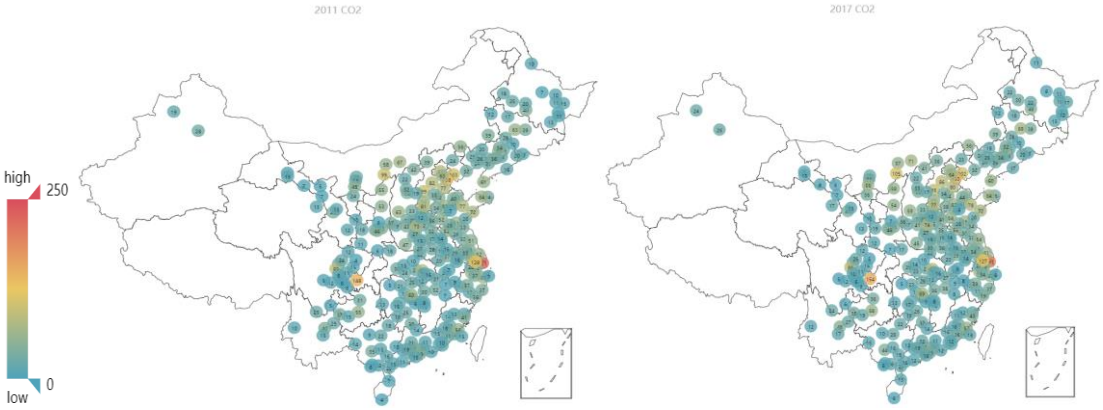

Figure S4: carbon emission heat map of all cities

(3)The scatter diagram of IIC and CEI

In order to show the trend of independent variable IIC and dependent variable CEI over time, Stata.15 software draws the scatter diagram of IIC and CEI. According to the scatter diagram, with the change of time, the construction of information infrastructure is conducive to reducing urban carbon emissions.The more developed the information infrastructure, the more advanced the informatization and digitalization technology, which enables industry to transition to low-carbon manufacturing.

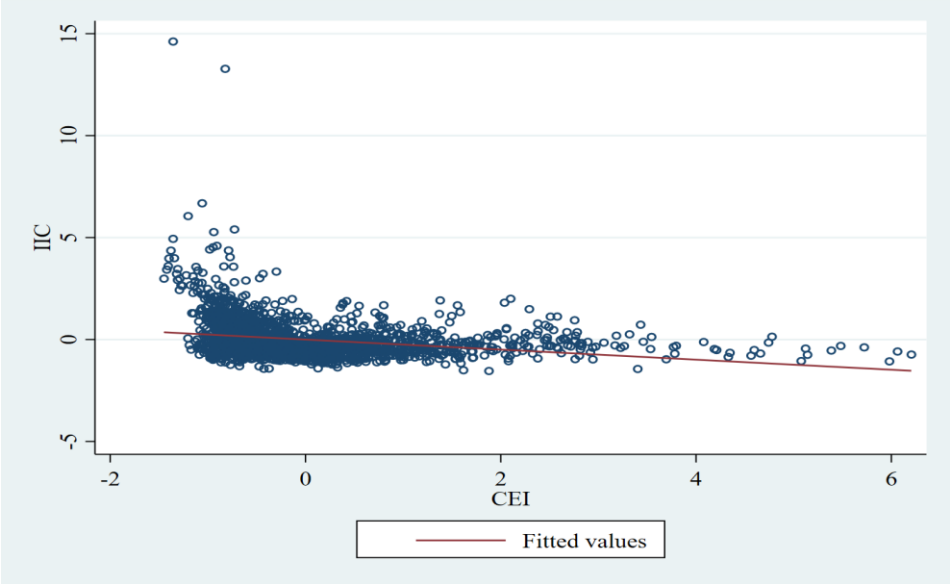

Figure S5: scatter diagram of IIC and CEI.

Variables description:（1）IIC：Four indicators are used to determine the quality of each city’s information infrastructure internet penetration (the number of Internet users per 100 people), employees employed in computer services and software (the percentage of urban employees employed in computer services and software), the total number of telecommunications services per capita, and mobile phone penetration (the number of mobile phone users per 100 people). The original data of the above indicators are obtained from “China City Statistical Yearbook”. The index system was created using principal component analysis (PCA).

（2）CEI：carbon emission intensity is the ratio of regional CO2 emissions to GDP.